

CLAIMS

We claim:

1 1. An automatic gain control system comprising:
2 an automatic gain control core circuit adapted to apply a
3 gain to an input signal to provide an output signal;
4 a power detector circuit adapted to receive the output
5 signal and provide a first signal which indicates a power level
6 of the output signal; and
7 a processor adapted to control the gain of the automatic
8 gain control core circuit based on the first signal.

1 2. The system of Claim 1, further comprising an analog-
2 to-digital converter adapted to receive the first signal from
3 the power detector circuit and provide the first signal as a
4 digital signal to the processor.

1 3. The system of Claim 1, wherein the processor provides
2 a calibration signal to the power detector circuit to calibrate
3 a reference level for the system.

1 4. The system of Claim 3, further comprising a digital-
2 to-analog converter adapted to receive the calibration signal
3 and provide the calibration signal as an analog signal to the
4 power detector circuit.

1 5. The system of Claim 3, further comprising:

2 a first switch, coupled between the processor and the power
3 detector circuit, adapted to be closed by the processor during a
4 calibration mode of the system to calibrate the reference level;
5 and

6 a second switch, coupled between the automatic gain control
7 circuit and the power detector circuit, adapted to be closed by
8 the processor during a continuous automatic gain control mode of
9 the system.

1 6. The system of Claim 1, wherein the power detector
2 circuit comprises:

3 a correlator; and

4 a low pass filter coupled to the correlator to determine
5 the power level of the output signal.

1 7. The system of Claim 1, wherein the processor provides
2 a coarse gain control signal and a fine gain control signal to
3 the automatic gain control core circuit to control the gain.

1 8. The system of Claim 7, wherein the automatic gain
2 control core circuit comprises a plurality of gain stages, with
3 each of the gain stages having a plurality of transconductance
4 stages.

1 9. The system of Claim 8, wherein the fine gain control
2 signal controls a bias current value for the transconductance
3 stages, and the coarse gain control signal selects which of the
4 transconductance stages contribute to the gain.

1 10. The system of Claim 8, wherein the plurality of
2 transconductance stages for each gain stage is associated with
3 at least one load impedance.

1 11. The system of Claim 10, wherein the load impedance
2 comprises a shunt, a shunt-series, a series-shunt, a series-
3 shunt-series, a T-coil, a T-coil with a cross-coupled capacitor,
4 or a series-T-coil.

1 12. An automatic gain control circuit comprising:
2 an amplifier adapted to apply a gain to an input signal to
3 provide an output signal;
4 a detector adapted to receive the output signal and provide
5 a first signal based on the output signal; and
6 a processor adapted to provide a coarse gain control signal
7 and a fine gain control signal to the amplifier based on the
8 first signal to control the gain of the amplifier, wherein the
9 processor determines a reference level value for the output
10 signal by providing a calibration signal to the detector and
11 setting the reference level value based on the first signal.

1 13. The circuit of Claim 12, wherein the detector is a
2 power detector and the first signal is based on an average power
3 level of the output signal.

1 14. The circuit of Claim 12, wherein the detector is a
2 peak detector and the first signal is based on a peak amplitude
3 level of the output signal.

1 15. The circuit of Claim 12, further comprising:

2 a digital-to-analog converter adapted to receive the
3 calibration signal and provide the calibration signal as an
4 analog signal to the detector; and

5 an analog-to-digital converter adapted to receive the first
6 signal from the detector and provide the first signal as a
7 digital signal to the processor.

1 16. The circuit of Claim 12, wherein the detector is a
2 power detector comprising a low pass filter coupled to a
3 correlator.

1 17. The circuit of Claim 12, wherein the fine gain control
2 signal is set to minimize an absolute value of the first signal
3 minus a reference value.

1 18. The circuit of Claim 12, wherein the amplifier
2 comprises a gain stage, with the gain stage having a plurality
3 of transconductance stages, wherein the fine gain control signal
4 controls a bias current value for the transconductance stages
5 and the coarse gain control signal controls which of the
6 transconductance stages contribute to the gain of the amplifier.

1 19. The circuit of Claim 18, wherein the plurality of
2 transconductance stages are associated with at least one load
3 impedance.

1 20. The circuit of Claim 19, wherein the load impedance
2 comprises a shunt, a shunt-series, a series-shunt, a series-
3 shunt-series, a T-coil, a T-coil with a cross-coupled capacitor,
4 or a series-T-coil.

1 21. A method of providing automatic gain control, the
2 method comprising:

3 providing a gain to an input signal to provide an output
4 signal;

5 monitoring a power level of the output signal; and

6 providing a coarse gain control and a fine gain control to
7 control the gain based on the monitoring to maintain the output
8 signal within a desired signal level range.

1 22. The method of Claim 21, wherein the monitoring
2 estimates an average power level of the output signal.

1 23. The method of Claim 21, further comprising calibrating
2 the monitoring to obtain a reference level value, with the
3 desired signal level range based on the reference level value.

1 24. The method of Claim 21, wherein the gain is performed
2 in stages, with the coarse gain control and the fine gain
3 control controlling a gain of each of the stages.

1 25. A method of calibrating and monitoring an automatic
2 gain control circuit, the method comprising:

3 providing a calibration signal whose signal level is
4 estimated to provide a reference value;

5 setting a range for an output signal based on the reference
6 value;

7 providing a gain to an input signal to provide the output
8 signal;

9 monitoring an output signal level of the output signal; and

10 adjusting a coarse gain of the gain to maintain the output
11 signal within the range.

1 26. The method of Claim 25, further comprising setting a
2 fine gain of the gain to minimize an absolute value of the power
3 level of the output signal minus the reference value.

1 27. The method of Claim 25, wherein the monitoring
2 estimates an average power level of the output signal.

1 28. The method of Claim 25; wherein the monitoring
2 estimates a peak amplitude signal level of the output signal.